

Initial Observation of High Resolution Velocity Profile and Stratification in the Sunda Strait

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LONG-TERM GOALS

This pioneering work has main goal of observing and determining the dynamics of controlling circulation in the Sunda Strait – a strategic passage for marine safety and international shipping. (Figure 1).

OBJECTIVES

The main objectives are to:

- (1) measure the magnitude and variability of Sunda Strait flow by deploying one full Barny Sentinel ADCP to determine the volume transport and its associated heat-freshwater fluxes;
- (2) measure vertical stratification of the Sunda Strait and to study its effects due to rough topography/bathymetry, monsoon, and South Java Current.
- (3) test the hypothesis whether coastally trapped Kelvin waves could penetrate the Sunda Strait. If it does, how it affects the Strait stratification, mixing, and its interaction with water from the Java Sea.
- (4) determine effects of strait dynamics of fish distribution and abundance.

APPROACH

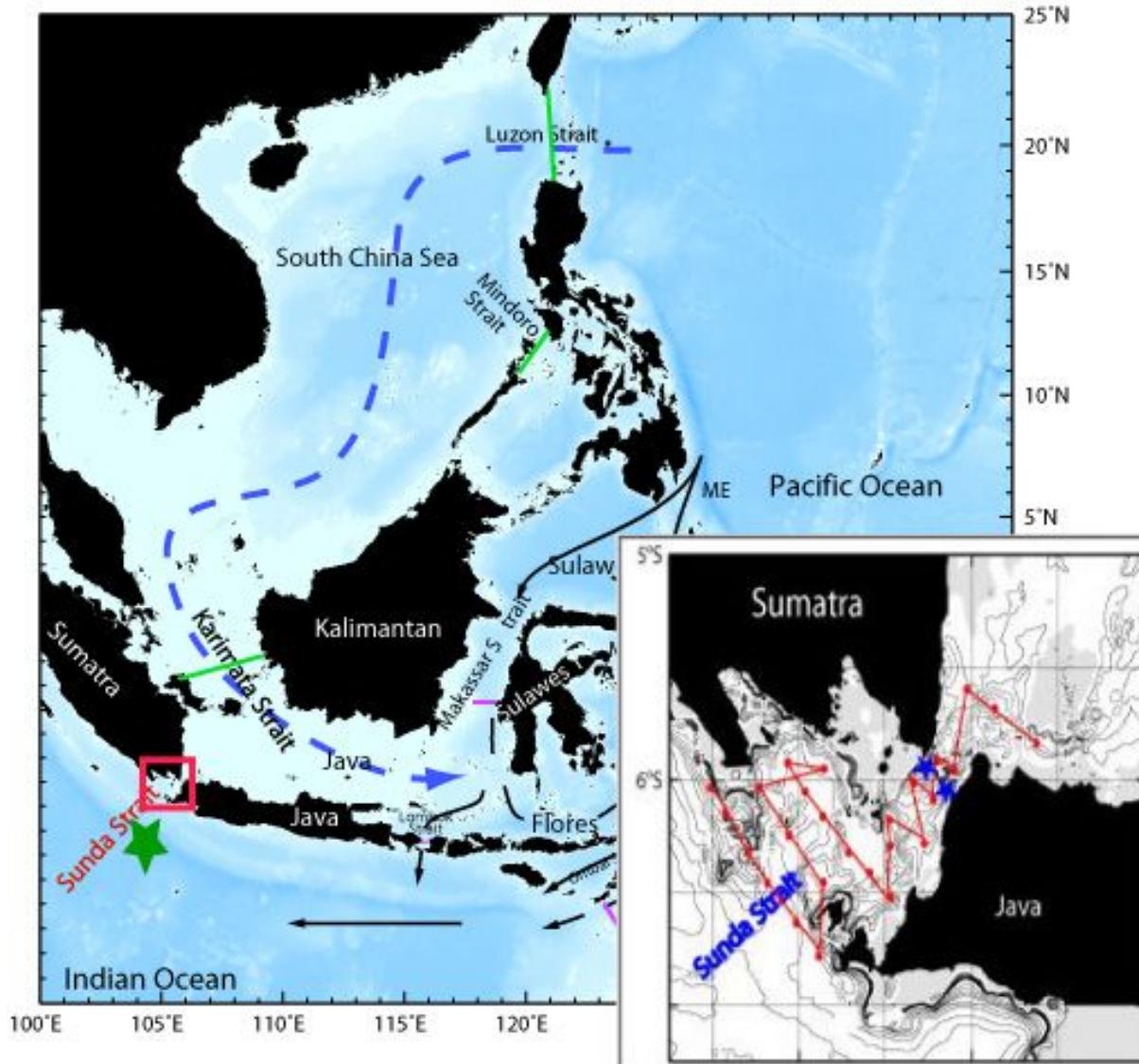
- ✓ Having international collaborative research among scientists from Lamont Doherty Earth Observatory (LDEO) United States, and Agency for Marine and Fisheries Research (BRKP) Indonesia and First Institute of Oceanography (FIO), China.
- ✓ Deploy two bottom mount ADCPs in the chocked point of the Sunda Strait
- ✓ Take CTD casts and water samples at various locations within the straits and underway fishfinder as well as ADCP.

WORK COMPLETED

- Implementation agreement among BRKP (Indonesia), FIO (China) and LDEO (USA) has been signed in August-September 2008. The first cruise will be carried out in the end of October 2008 using R/V Baruna Jaya VIII operated by Indonesian Science Institute.

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- All instruments have been bought and on the way to Jakarta-Indonesia.
- Barny sentinel ordered from Sielco Italy is being tested before it will be sent to Jakarta in the first week of October 2008.
- Security and research clearances from the Indonesian government are being processed by our collaborator from Indonesia (BRKP).



[Figure 1. Indonesian throughflow pathways: Pacific-Makassar Strait-Indian Ocean and Pacific-Luzon Strait-South China Sea-Java Sea. Sunda Strait (red box and inset) connects Java Sea and Indian Ocean. Blue stars (inset) are plan for mooring locations in the Sunda Strait and red line is plan for ship track and red-dots are CTD stations. Green star is Weidong (FIO) upwelling mooring]

RESULTS

- Since the grant just began this year, no scientific results yet.

IMPACT/IMPLICATIONS

Understanding dynamics of Sunda Strait has both scientific and economic benefits i.e. spatial and temporal variability of fish abundances, marine safety and environment and shipping. The Sunda Strait, which connects tropical Indian Ocean and Java Sea (Figure 1), is located between Java and Sumatra centered at 6.0°S and 105.0°E. An active growing volcano “*anak Kratatau*”, which is located in the middle of the Strait, adds to the complexity of the rough topography. The Strait provides the first gap of series of Indonesian islands from Sumatra to Timor, where equatorial Kelvin waves from the tropical Indian Ocean propagate eastward along southern coast of this island series and seasonal upwelling along the southern Java-Sumatra (*Arief Murray, 1996; Sprintall et al., 2000; Susanto et al., 2001*). Whether these waves could enter the Sunda Strait is still unknown. Southern Java-Sumatra is also center of interannual variability associated with Indian Ocean Dipole (IOD). Hence, dynamics of Sunda Strait is hypothesized to be affected not only by the complex coastline topography and bathymetry, but also interactions between intraseasonal associated with Madden Julian Oscillation, monsoon, South Java Current, and Indian Ocean Dipole.

RELATED PROJECT

- ✓ Ongoing project supported by NOAA to measure long-term ITF variability in the Makassar Strait as a continuation of the INSTANT program, which was supported by NSF (completed in 2007).
- ✓ Ongoing project supported by the Chinese NSF and led by Prof. Yao-chu Yuan of the Second Institute of Oceanography, China, by deployed moorings in the Luzon Strait in Spring 2008.
- ✓ Ongoing collaborative project (China-Indonesia) to deploy moorings in the Indian Ocean south of the Sunda Strait in November 2007. Chinese PIs led by Dr. Weidong Yu of the First Institute Oceanography is supported by Chinese NSF and Indonesian PIs led Dr. Sugiarta (BRKP, Indonesia). Both of them have been my long-term collaborators.
- ✓ Ongoing collaborative project (Indonesia-China-USA) on South China Sea – Indonesian Seas Transport/Exchange (SITE) in the Karimata Strait has been funded by NSF starting Spring 2008. One mooring (supported by ONR DURIP N00014-06-1-0738) has been deployed in the Karimata Strait in December 2007 and will be recovered prior the Sunda cruise in the end of October 2008.

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